

**Pinnacles National Monument Feral Pig Eradication Plan  
Environmental Assessment**

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## **INTRODUCTION**

Pinnacles National Monument (Pinnacles) was established in 1908 to protect, for scientific interest, the natural formations known as the Pinnacles Rocks. Today, the monument includes 24,265 acres, 16,048 of which are designated wilderness (67%). Pinnacles is home to a rich array of native species and habitats, including chaparral, oak woodlands, riparian areas, grasslands, talus caves, and the striking Pinnacles Rocks formations. Pinnacles also preserves diverse cultural landscapes, resources, and historic structures. Located in one of the fastest growing regions in California (Figure 1), Pinnacles is enjoyed by some 200,000 visitors annually for its hiking trails, natural quiet, climbing opportunities, wildflower displays, dark night skies, and wilderness qualities.

As a unit of the National Park System, Pinnacles is mandated to conserve the park's resources "in such manner and by such means as will leave them unimpaired for the enjoyment of future generations" (NPS Organic Act, 1916). This mandate has been reaffirmed through an amendment to the Organic Act (Redwood Act, 1978), subsequent environmental law, and NPS policy. The focus of national park resource management is to maintain or restore native species, ecosystems, and processes and to resist establishment of alien, non-native organisms.

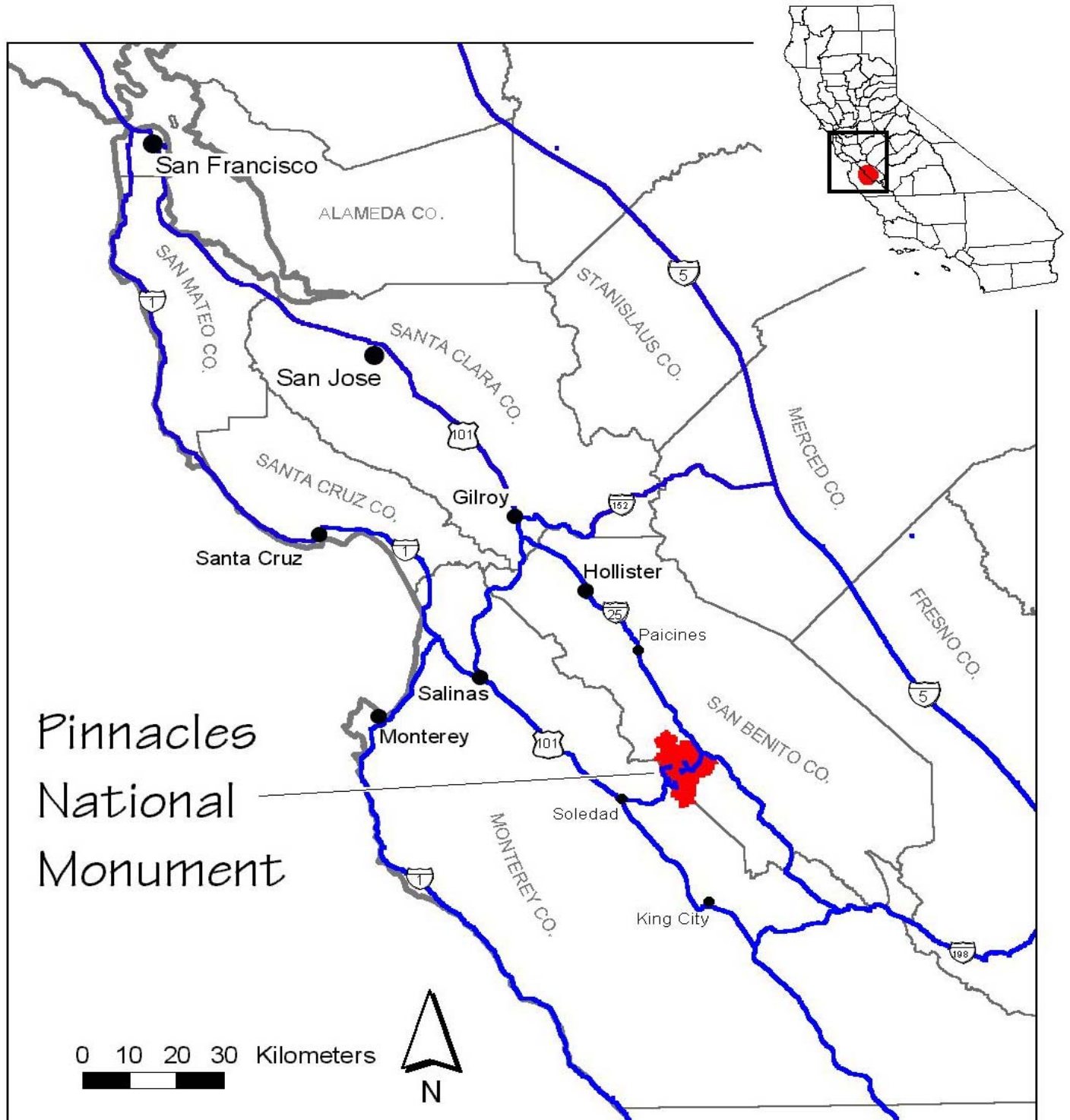
Issues and concerns affecting this proposal were identified through a series of public scoping meetings held in October 2001, past NPS planning efforts, consultation with interested public groups, and input from state and other federal agencies. Issues raised during the public meetings included public hunts, use of alternative methods such as contraception, sterilization, or poison, use of the meat for human or animal consumption, relocation on to other properties, contract hunters, hunting by park employees, use of dogs in hunting, public education, trap and kill techniques, cost effectiveness, and resource restoration. The specific issue to be addressed in this document is the management of feral pigs within the fenced area of the park.

Specific impact topics were developed for discussion focus, and to allow comparison of the environmental consequences of each alternative. These impact topics were identified based on federal laws, regulations, and Executive Orders; NPS Management Policies (2001); and NPS knowledge of limited or impacted resources. A brief rationale for the selection of each impact topic is given below. This proposal is consistent with the Pinnacles National Monument Master Plan (1975), the East Unit Development Concept Plan (1993), and the Resource Management Plan (1999).

## **PURPOSE AND NEED FOR THE ACTION**

Pinnacles proposes to eradicate non-native feral pigs from the majority of the monument to protect native species and habitats. This non-native species is relatively new to Pinnacles (first observed in the park in the late 1960s), and is a hardy, adaptable, and highly destructive force to the native ecosystem. Population estimates within the park are cyclic, and range between 100 animals in drought cycle years and 900 in wet years. In the right conditions, feral pigs can have litters of 10-14 piglets twice yearly. A single pig can root up to 15 acres of ground per night, and collectively the pigs have caused extensive damage throughout the park. Pigs destroy native vegetation, have a dramatic impact on the native oak populations, affect the reproduction of native shrubs and trees, create fertile ground for invasion of exotic plant species, compete directly with native wildlife, cause extensive erosion, and destroy the habitat of sensitive amphibian and reptile species (including a federally-listed species). Pigs routinely root along sensitive riparian areas, roads and trails, through picnic areas, and under building foundations,

Figure 1



causing substantial damage each year. Eradicating this destructive non-native species is consistent with NPS law and policy for conserving, protecting, and restoring native species, ecosystems, and processes.

### ***Pig Fence***

Recognizing the need to exclude pigs in order to protect park resources, Pinnacles initiated construction of a pig-proof fence in 1985. The fence is designed to prevent pigs from passing through or rooting under the fence, while allowing free passage to native species.

To ensure the longevity of the fence, it was constructed in “defendable” locations, along ridge tops and high ground to minimize the number of water crossings. Upon completion, the fence will be 32 miles long and surround ~14,500 acres of the park’s 24,265 acres. Construction of the final 3.5 miles of fence is underway, and completion is anticipated in fall 2003. The fence will protect the majority of wilderness areas in the park (Figure 2).

### **AFFECTED ENVIRONMENT**

The impact of feral pigs on park resources is a serious management issue. Pigs are considered a serious threat to the integrity of Pinnacles’ ecosystem. These impacts include soil disturbance and erosion, direct competition with native wildlife, habitat modification, destruction of vegetation, and disturbance of the built environment including building foundations, trails, picnic areas and culverts.

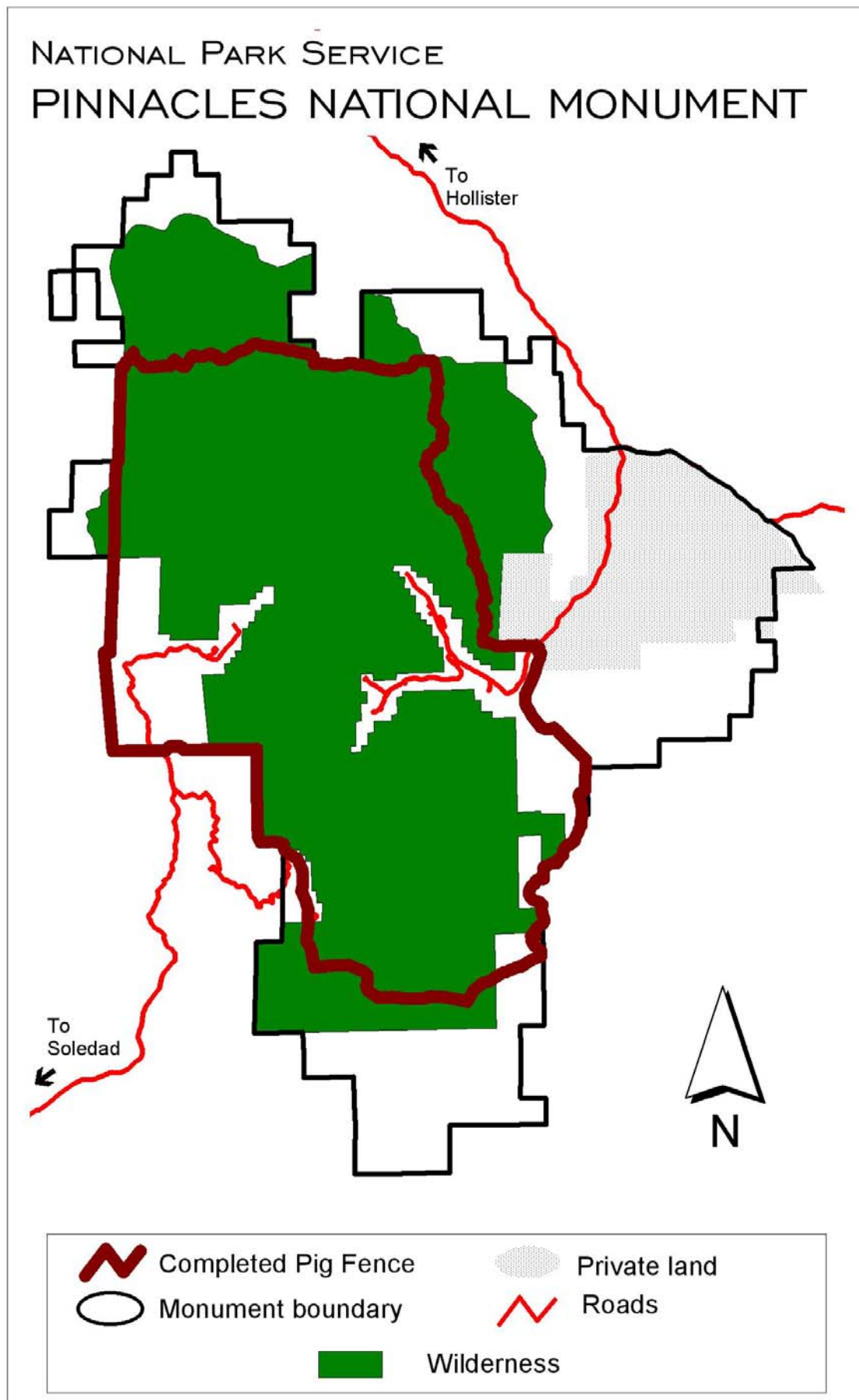
### ***Wild Pigs***

The term wild pig refers to wild boar and feral hogs, both varieties of *Sus scrofa*. Feral hogs originated from domestic pigs that escaped from captivity. Feral hogs have existed in various parts of California since the time of Spanish settlement (late 1760s). Wild boars, a European import, were brought to the Eastern United States in 1910 and subsequently introduced to Monterey County in 1925. Since then, feral hogs and wild boar have interbred and these hybrids expanded both naturally and with the aid of humans throughout California. Wild pigs — feral hogs, wild boars, and hybrids — are not native to California, and are considered an exotic species.

The first pigs arrived in San Benito County with the Spanish at Mission San Juan Bautista in 1797. Until 1955, pigs stayed localized in three small sections of San Benito County. Between 1955 and 1975, there was a dramatic increase in wild pig distribution across the county. This resulted from efforts by several hunters and landowners to introduce wild boar from Monterey County to improve the sport hunting quality of the local pig population. The wild boar’s natural ability to survive harsh conditions and its tendency to range farther has aided in the spread of these animals.

Wild pigs are omnivorous; their diet is primarily composed of grasses, acorns, berries, leaves, bulbs, roots, insects, frogs, other small amphibians, and carrion. Pigs appear to be nomadic, wandering in search of food and water. They usually stay in an area until food and water are diminished or they are disturbed. It is uncertain how much the environment (food, water, and predation) limits the wild pig’s ability to move into new areas. Pigs tend to prefer cooler locations, require water daily for drinking, and have population booms and crashes related to rainfall and acorn production. Pigs are attracted to mud seeps or springs and prefer shaded vegetative cover. They are found in chaparral, particularly the cooler, moist north-facing slopes. They are not very tolerant of heat often spending hot days resting in the shade or in mud wallows and are primarily nocturnal during the summer. At Pinnacles and in San Benito County, wild pigs are generally found in oak woodlands and along stream corridors. Wild pigs are highly

Figure 2



mobile, and have high reproductive rates (2 litters of up to 14 piglets each annually), making control of this animal challenging.

Wild pig sightings in Pinnacles National Monument were relatively rare prior to the 1970s. During the late 1970s, it became apparent that wild pigs were moving into and staying in the monument. Pig sightings increased from occasional to common and were sighted over an increasingly larger area. As the pig population increased, so did the impacts to the natural environment. Data compiled on wild pigs and their relation to the environment confirms that pigs are very destructive animals. They destroy native vegetation, compete with as well as eat native wildlife for food, harbor diseases, impact the soils, cause increased erosion, and degrade water quality.

### **Impact Topics included in this Document**

Vegetation: The NPS is mandated to protect the natural abundance and diversity of Pinnacles' natural communities. Biologists have documented extensive pig rooting in riparian and oak woodland areas, which causes substantial destruction to bulb plants like Shooting Stars and wild orchids, seriously inhibits the regeneration of oaks, and causes conditions that favor establishment of non-native species over native species. Rooting lifts up the soil, exposing it to the hot dry summer air. This dries out the soil and forces plants to work harder to access water. Pigs consume a huge amount of acorns, pine nuts, and chaparral fruits and have been implicated in decreased seed germination and seedling survival for these species.

Non-native plant and weed introduction is another impact. Non-native weeds are spread by animals through two basic mechanisms - passing through the digestive system intact and sprouting and carrying seeds on their coats subsequently transporting them many miles from their source. Pig rooting removes vegetative cover and creates bare ground which encourages the establishment of invasive exotic plant species.

Vegetation is affected in all of the alternatives, therefore vegetation will be addressed as an impact topic.

Fauna: Pigs affect the wildlife resources through direct competition for limited food resources and by consumption. They compete directly with deer, birds and other wildlife for acorns, insects, and other food sources. Besides competing with other animals, pigs also feed on them. Pigs consume a huge number of native invertebrates such as earthworms and small vertebrates such as salamanders. Pig rooting destroys the leaf litter and otherwise alters the habitat of native animals such as voles, salamanders, and frogs. Fauna will be addressed as an impact topic.

Special Status Species: This section will address all threatened or endangered species (Federal and State Listed), species of special concern as identified by the California Department of Fish and Game, and rare species. The 1973 Endangered Species Act, as amended, requires an examination of impacts to all federally-listed threatened or endangered species. NPS policy is to treat species of special concern or rare species as if protected by the Endangered Species Act.

The United States Fish and Wildlife Service (USFWS) lists 15 special status species within San Benito County and may be within the project area (Appendix A). The California Department of Fish and Game (CDFG) lists 21 species of special concern that occur within San Benito County and may be within the project area (Appendix A). Therefore, special status species will be addressed as an impact topic.

Geologic Resources – Soils and Streams: Pig activity turns over rocks, loosens soil increasing erosion, and creates wallows in streams. They often root in soft soils along streams and damp areas. Due to the extremely thin topsoil at Pinnacles, any loss of soil is a concern. Furthermore, the additional topsoil entering streams increases siltation and affects water quality. Rooting also disrupts nutrient cycles, like nitrogen and carbon, which are the foundations of a functioning ecosystem. Therefore, geologic resources will be addressed as an impact topic.

Wilderness Values: Wilderness is defined as areas where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain. About 90% of Pinnacles designated wilderness is inside the pig fence. The detrimental effect of pig rooting on the aesthetic and wilderness values of the park has been increasingly noticed and reported by visitors, so wilderness will be addressed as an impact topic.

As required by the Wilderness Act of 1964, a minimum requirement analysis has been completed for this project and is included as Appendix B. The minimum requirement process is a two-step process that documents 1) the determination as to whether or not a proposed management action is appropriate or necessary for the administration of the areas as wilderness, and does not pose a significant impact to the wilderness resources and character; and, 2) the selection of the management method (tool) that causes the least amount of impact to the physical resources and experiential qualities (character) of wilderness.

Cultural Resources: There are several Native American archeological sites along Chalone Creek. In as much as pigs root indiscriminately, there is potential that their behavior will impact archeological sites. Pigs routinely root along historic trails, walls, culverts and building foundations and have the potential to undermine these historic structures. Cultural resources will be addressed as an impact topic.

Visitor Recreational Use and Experience: Under the Organic Act of 1916, the National Park Service is directed to provide visitor enjoyment of the resources in such a way as to leave the resources unimpaired for future generations. Since all alternatives affect visitor experience of the Monument, visitor use and experience will be addressed as an impact topic.

Water Quality: The 2001 NPS *Management Policies* provide direction for the preservation, use and quality of water originating, flowing through, or adjacent to park boundaries. The NPS seeks to restore, maintain, and enhance the quality of all surface and ground waters within the parks consistent with the 1972 Federal Water Pollution Control Act as amended, and other applicable federal, state, and local laws and regulations. Since pig activity degrades water quality, it will be addressed as an impact topic.

### **Impact Topics Dismissed from Further Analysis**

Other Topics: The Council of Environmental Quality established impact topics that must be considered. These mandatory topics are: possible conflicts with the proposal and previous plans and policies; energy requirements and conservation; urban quality; social or economically disadvantaged populations; air quality, seismicity, prime agricultural lands; wild and scenic rivers; sacred sites and Indian Trust resources; migratory birds. Each of these topics was analyzed related to the potential alternatives. Each was dismissed because of lack of relevance to and/or lack of impact from the proposed project.

## **ALTERNATIVES**

The alternative section describes four management alternatives for this project. These alternatives were developed after public scoping sessions. The Environmentally Preferred and NPS Preferred Alternative is Alternative B. This alternative proposes a one-time intensive eradication program with ongoing monitoring/maintenance to keep the pig population at zero. A summary table comparing the environmental consequences of each alternative is included at the end of the alternatives section.

### **Alternative A: No Action**

This alternative would maintain the current management of feral pigs which is that no action would be taken to control or eradicate pigs from monument lands. Pig populations would continue to rise and fall, following food availability. Pigs would continue to affect native vegetation by direct consumption as well as destruction of plants by rooting. Additionally, pigs would continue to compete with native wildlife for food resources as well as eat native wildlife. The integrity of the monument ecosystem would be affected by continued soil disturbance and accelerated erosion related to pig rooting. Infrastructure for visitor services (trails, roads, picnic areas) would continue to be damaged by pigs in search of food.

Completion of the pig fence will do nothing to minimize this impact since the pigs will then be captive within the fence. Future maintenance of the fence would be downgraded to a level sufficient to keep cattle out of Pinnacles, allowing feral pigs to range freely throughout monument resources continuing degradation into the future.

### **Elements Common to Action Alternatives**

Alternatives B, C and D all require the use of capture traps and have an associated vegetation study. Alternatives B and C would also require the use of dogs to assist the hunters. These methods are described below rather than repeated in each alternative.

### ***Historical Precedence***

Several other national and state park units have had to deal with feral pigs and resources damage. Channel Islands National Park (California), Great Smoky Mountains National Park (Tennessee), Virgin Islands National Park, Hawaii Volcanoes National Park, and several state parks in California have developed feral pig eradication programs. The techniques outlined below have been developed and refined at these locations, thus Pinnacles will be building on the successes and experiences of these sites.

### ***Capture Methods***

A multiple capture trap that allows entire family groups to be caught would be used for the first phase of this alternative. It is a large structure (approximately 10ft. x 10ft.), with a closed top and a spring hinged door that allows pigs to enter but not exit. The door is set open to allow the first (or several) pig(s) to enter. There are small piles of fermented bait to lure the pig(s) inside. There is a large pile of grain under a 5-gallon bucket that has a trip wire attached to it. When a pig knocks the bucket over, the door swings shut, trapping the pigs inside. If other pigs are still outside, they can push their way inside the trap, a likely behavior because of strong family/social ties. Each trap is constructed from hog wire panels (4"x4" squares), t-stakes, non-barbed wire and will follow designs used at other locales. During the eradication, population size will be monitored. This will inform park staff how effective eradication efforts are and how many pigs still remain.

Previous work indicates pigs have a home range of approximately 6 square miles and effective trap placement is about 2 miles apart. This maximizes the number of individuals targeted by a



trap and minimizes overlap. The process will use up to 16 traps to cover the fenced area. Because Pinnacles is primarily wilderness and lacks roads to the vast majority of its land, all trap supplies will be packed into the backcountry on mules or flown in with helicopters and removed the same way. Pigs are very wary of new structures in their area and it will take time for them to become accustomed to the traps. Once a trap is constructed, it will be baited for one week, with the trap locked open. It has been demonstrated that locking the trap open and baiting for a week encourages larger numbers of pigs (entire families) to enter the trap. In situations where traps were set the first night, only 1-2 pigs were caught and the remaining pigs in the area learned to be trap shy and never approached traps again. This is also the time in which the pigs are trained that there is a large amount of food under the 5-gallon bucket and to move directly to the back of the trap to get the “best”.

Each trap would be checked daily to ensure humane treatment of captured animals. Pigs found in traps would be killed onsite. Their carcasses will be removed from the traps and spread throughout the local area. Since the pigs have taken resources and nutrients from the monument’s ecosystem, these nutrients will be returned to the system. The carcasses would not leave the park. On the days that the trapping crew is off, the traps will be locked open preventing any animals from inadvertently becoming trapped. Traps will be run until no pigs are being captured in them. If photo points indicate that there are still pigs in the area, trapping will halt for a short time to desensitize the pigs and then would begin again.

Trapping is most effective when natural food supplies are lowest (after May when the grasses and herbs have dried and before September when acorns begin to drop). Trapping will be used most intensively at the beginning of the project; however it will likely continue to be used throughout the project. After 3 sets of trap/rest with no captures, the remaining pigs will be deemed untrappable.

### ***Hunting Assisted with Dogs***

In alternatives B and C, to remove the remaining untrappable pigs, hunters will be assisted by dogs. Pigs are intelligent animals and without the use of dogs to find them by scent, the unaided hunter quickly becomes ineffective. Because of concerns related to dogs chasing non-targeted animals, all dogs used on this project would have to demonstrate that they stay on the scent of pigs and will wear shock collars so they do not chase other animals, specifically deer, bobcats, mountain lions, foxes, and coyotes.

To increase effectiveness, hunters would rotate through areas of a park, hitting one area very hard for 1-3 days, and then move to another section of the monument. Due to logistical constraints associated with visitor use, no hunting would occur on weekends, Spring Break, or holidays. It is estimated that it would take 2 weeks to cycle through the monument. Pigs are most active between dusk and dawn so hunting would be allowed dusk to dawn as well as during the day. Hunters would use silencers to minimize the sound disturbance caused by gunfire and reduce the sensitivity of the remaining pigs. Occasional trail closure may be needed to ensure visitor and employee safety during hunting periods. Each 2 week hunting period will be followed by a break. After the break, the hunter would begin again and cycle through the areas in a different pattern to prevent the pigs from adjusting to the hunter’s schedule. All pigs will be confirmed dead. All carcasses would be left on site. Non-lead bullets will be used to prevent secondary poisoning of scavengers.

### ***Vegetation Study***

Pinnacles has initiated a long term vegetation monitoring program to monitor and document the impact of feral pigs on native vegetation, the recovery of the land inside the fence and the level

of impact outside the fence. The study establishes long term plots both inside and outside the fence in similar vegetation types and measures rooting disturbance, plant species relative abundance and diversity, and tree seedling survival/tree regeneration potential in three key habitats. The study was begun Spring 2003 and will provide “before removal” and “after removal” baselines within the fenced area and ongoing comparative monitoring outside the fence. Using a variety of standard and newly developed methods, the study will monitor the rate and extent of recovery of different types of vascular plant communities at Pinnacles as feral pigs are reduced in number to eventual eradication 3± years hence. The quantitative data from the study will aid in documenting the recovery of native flora and fauna of Pinnacles and provide critically important scientific support of the parks’ major ecological restoration efforts. The study will also be applicable and important for the long term conservation of California’s nationally unique oak woodland ecosystems.

The vegetation study will include 3 habitat types – grassland, oak woodland, and riparian. Each habitat type will have 3 kinds of plots established - rooting disturbance transects, vegetation plots for monitoring changes in plant community characteristics, and seedling/tree regeneration potential transects. Plots will be in close proximity to each other but cannot be co-located on top of one another due to impacts on data collected. Each plot type will have locations inside and outside the fenced area.

The vegetation plots for monitoring change will have up to 18 plots in each habitat on both sides of the fence that will be permanently marked with 2 pieces of rebar at each plot end driven into the ground to permit accurate re-location and measurement year after year. The rebar will be driven so that 6-12 inches remain above ground and will be capped and painted. Several other alternatives were considered to the rebar placement, but due to the need for exact replication of plot boundaries over time, rebar markers were permitted. These plots will be used to evaluate the effect of reduced feral pig rooting disturbance on plant species diversity and relative abundance. Data resulting from plot analyses will be used to estimate a variety of plant community characteristics; absolute and relative cover for each plant species, plant species richness, evenness, species diversity, spatial plant community diversity.

The rooting disturbance transects will be located by GPS and photographic points, no permanent markers will be used. There will be up to 15 transects randomly placed in each habitat type on both sides of the fence. This portion will also include sampling of aboveground vegetation biomass. Two 2-m<sup>2</sup> quadrat positions will be randomly selected along each transect where pig rooting is first encountered. Drawings will be prepared to estimate rooting disturbance in these “biomass collection quadrats” prior to collecting aboveground biomass by clipping all nonwoody vegetation to ground level. “Control biomass quadrats” will be established in unrooted areas as near as possible to the rooted biomass collection quadrats and matched to the dominant vegetation. Clipped vegetation will be oven or air-dried and data analyzed between quadrats for proportional differences. Approximately .2 of an acre each year of active study will be involved in the biomass sampling section.

The seedling/tree regeneration transects will establish 15 “belt transect” stations will be established in oak woodland habitats on both sides of the fence, these locations will be established by GPS and photographic points. Each transect will be surveyed for tree seedlings. Data will be analyzed by assessing changes in the number of oak seedlings and changes in the indices of tree regeneration potential. As feral pigs are removed from Pinnacles, we expect more acorns may survive to germinate, and more tree seedlings to survive to saplings due to reduced damage/mortality from rooting.

## **Alternative B: Eradication – NPS Preferred Alternative – Environmentally Preferred Alternative**

This alternative would use the capture methods and hunting assisted with dogs described above to eliminate pigs from within the fenced perimeter of the monument. Based upon control efforts of feral pigs on other public parklands (e.g. Channel Islands National Park, Hawaii Volcanoes National Park, California State Parks), an effective pig management program must rely upon more than one method of control. Trapping is the most cost effective method for the initial population reduction. Trapping would remove 80-90% of a pig population. The remaining pigs would need to be hunted. This alternative would remove pigs from within the monument fence, eliminating the impacts that pigs currently have on over 60% of Pinnacles National Monument.

Humane euthanization of animals is addressed in Title 7, chapter 48, Section 1902 of the U.S. Code. It states "...in the case of cattle, calves, horses, mules, sheep, swine, and other livestock, all animals are rendered insensible to pain by a single blow or gunshot..." Consultation with veterinarians confirms that a bullet to the brain or heart is the most humane way to kill an animal. Due to the expertise required with eradicating pigs, trapping and hunting will be done by NPS qualified hunters.

During the trapping and hunting efforts, the field crew will monitor for pig signs and conduct photo point surveys to determine the pig population status. Pigs euthanized during this project will have samples collected for scientific purposes. The following will be measured on the pigs: rump fat, age (teeth), weight, length, reproductive condition, and gender. This data will help confirm our direct monitoring results and provide scientific data on feral pigs for future reference.

Pig eradication efforts at Channel Islands and pig control work at Hawaii Volcanoes indicate that approximately 14,000 acres is an effective area for control efforts. Larger areas need to be subdivided in order to effectively pursue pigs.

### ***Time Frame***

The initial eradication is expected to take approximately three years. It is expected that the fence will maintain a pig-free area the majority of the time. However, it is acknowledged that breaches in the fence will occur, particularly related to flooding. Due to the longevity of the fence project, the NPS field crew has a good working knowledge of vulnerable fence locations and walks the fence line in these areas regularly and after natural events to assure its structural integrity. The entire fence line will be checked quarterly. It is anticipated that occasional breaks in the fence would allow to pigs re-enter the monument. This alternative would allow for the continued eradication of immigrating pigs, using trapping or hunting as described above. Future eradication efforts are expected to be small in scale, since the effort would be undertaken immediately after the breach was discovered.

### **Alternative C: Control via Sterilization**

This alternative would use the capture methods and hunting methods described above. Instead of using bullets to immediately euthanize the pigs, each pig would be singled out in the pen, injected with a chemical sterilant, and permanently ear notched or tail cut to indicate it has been treated then released. Every pig within the fenced area would have to be caught and treated for this alternative to be successful.

Initially, approximately 10 years of drug research and development would be needed to refine the products currently being tested on deer so they would be effective with pigs. Once the drug is

developed, it is estimated that it would take approximately 5 years to capture, sterilize, and mark every pig within the fence. After administration of the sterilant, the pigs would be released to live out their lives, which average 5-7 years. This would create a 20-27 year initial time frame that pigs would remain active in the park under the best case scenario, and excludes pigs entering through fence breaches. Should drug development take more time or it proves more difficult to capture and treat all the pigs, the time frame would expand accordingly.

In the future, chemical sterilization could be a relatively benign way of eliminating feral pigs from an area under controlled conditions. However, animal birth control technology is not yet adequate to achieve control of feral pig populations. Research on single dose sterilization in deer indicates that under optimum conditions only 95% of the population would be sterilized. In species with low reproductive rates, like deer with only 1-2 offspring a year, 95% sterilization is an effective tool. Feral pigs have a very high birth rate, and treatment would have to be 99% successful to effectively control pig populations.

It is unknown if a reduction in the number of feral pigs within the fenced area will reduce pig impact or if it will merely result in fatter pigs. It is likely that the same areas would be disturbed. These potential impacts will be addressed in the Environmental Consequences section.

### ***Time Frame***

After drug development, the initial treatment is expected to take 5± years to capture and treat every pig within the fenced area. It is expected that the fence will maintain a pig-free area the majority of the time. However, it is acknowledged that breaches in the fence will occur, particularly related to flooding. Due to the longevity of the fence project, NPS field crew has a good working knowledge of vulnerable fence locations and walks the fence line in these areas regularly and after natural events to assure its structural integrity. The entire fence line will be checked quarterly. It is anticipated that occasional breaks in the fence would allow to pigs re-enter the monument. This alternative would allow for the continued treatment of immigrating pigs, using trapping and hunting as described above. Future treatment efforts are expected to be small in scale, since the effort would be undertaken immediately after the breach was discovered.

### **Alternative D – Control via Population Reduction**

This alternative would only use the capture methods described above. All captured pigs would be euthanised and their carcasses distributed throughout the local environment. Untrappable pigs would be left at large. There would need to be an annual capture/kill program to maintain low levels of pigs in the monument.

Implementing this alternative would require the establishment of an annual capture/kill program. During the initial year of the capture program it is expected that about 80-90% of the pigs would be caught and killed. Since all work with feral pigs shows they are quick to learn evasive behaviors and the capture program would be ensuring that only the smartest pigs survived, it is reasonable to assume that diminishment in the capture rate would become evident within the next two years. Experience at other locations indicates that the capture rate drops to 50-70% overall. To achieve effective control, the program would need to be aggressive in achieving its annual reduction goals.

It is unknown if a reduction in the number of feral pigs within the fenced area will reduce pig impact or result in larger, better fed pigs. It is likely that the same areas would be disturbed. These potential impacts will be addressed in the Environmental Consequences section.

### ***Time Frame***

This alternative requires an annual hunt to keep pig populations to a reduced level; most likely this would occur sometime during June-August. Since an annual hunt would be required, the fence could be walked and repaired as needed during the same time frame.

### **ALTERNATIVES CONSIDERED AND DISMISSED**

In public scoping, a variety of issues were raised for consideration in this document. These issues, described below, were investigated but dismissed from further consideration for reasons described below.

#### ***Public Hunting***

Several commenters requested that a public hunt be used for initial or continued control. Public hunting within units of the National Park System is prohibited unless specifically provided for by law. The enabling legislation that created Pinnacles National Monument does not provide for public hunting within its legal boundary, therefore, Pinnacles has no legal authority to permit public hunting for the removal of feral pigs.

#### ***Relocation***

An alternative to relocate pigs from Pinnacles to another location was proposed. While Pinnacles has the authority to manage species within its boundary, it has no jurisdiction beyond it. In consultations with the California Department of Fish and Game (CDFG), the relocation authorizing agency, it was determined that a request for relocation would be denied. Relocations in the past have led to inadvertent spreading of disease. Without the approval of CDFG to move animals out of Pinnacles, such action would be illegal.

#### ***Herding***

Herding the pigs out of the park when only a single gap remained in the fence then closing the gap was considered. Prior to moving pigs off monument lands, the park would need permission from the CDFG. In consultation with CDFG, they indicated that it is not their policy to permit the movement of animals across jurisdictional boundaries. Consultation with pig specialists said it would be difficult at best and more likely impossible to herd pigs through the chaparral habitat that dominates Pinnacles' landscape.

#### ***Use of Poison***

There are a number of toxicants which can be effective as part of an eradication program. However, each of the potential poisons could negatively affect non-target species. It would be very difficult to protect non-targets from incidental poisoning. For these reasons, and because hunting can achieve the park goal without the secondary impact, poison would not be used as a tool in the eradication of feral pigs from Pinnacles.

#### ***Use of Snares***

Snares are an effective and inexpensive method of trapping pigs; however the use of snares at Pinnacles could capture non-target animals such as the mountain lions, bobcats, grey fox, raccoons, snakes, skunks, rabbits, opossums or badgers. Therefore, snares will not be used in this project.

#### ***Surgical Sterilization***

At present, surgical sterilization is the only known effective method for sterilizing pigs. Both males and females would have to be treated to reduce their biological urge to reproduce. This would entail capturing every pig within the fenced area, castrating the males in the field and transporting the females offsite for surgery, then returning them to the park to live out their lives.

Complications are that not all pigs are trappable; the trapping locations are not near vehicle access so all of the pigs would have to be tranquilized and carried out to vehicles either via hand carry or helicopter transport; untrappable pigs would have to be hunted with dogs, shot with tranquilizers, found by the dogs after the tranquilizer took effect, accessed by humans through very difficult terrain and chaparral vegetative cover, then carried out by hand which could require as many as 6 people for a 350 pound pig through difficult terrain and chaparral vegetation. Chaparral vegetation consists of very dense intertwined shrubs 1- 12 feet in height, cutting through it is very slow and difficult and generally it is easier to crawl through it using animal "tunnels". While access to the downed pig possibly could be achieved within a reasonable time frame, carry out of the pig would require cutting trail which would threaten the life of the pig having to be tranquilized for such a long duration just for carry out, then it would need to be transported to a veterinarian for surgery and returned to the park for release. At present it is unknown if feral pigs have home territories, so this aspect would have to be researched to see what disruptions may occur if treated returning pigs are simply released at a humanly convenient location or if they would have to be returned to their capture location. This method poses extreme logistical challenges, and poses an unacceptable risk to staff transporting animals in rugged terrain.

### ***Other***

Several commenters requested that the pig carcasses be used for food instead of leaving them in the wild. In order for meat to be distributed, it must be inspected by an approved Food and Drug Administration meat inspector. Meat inspectors can only inspect and approve domestically raised stock and not wild game. It would therefore be illegal for Pinnacles to provide meat for human consumption from this project. The idea of using the pigs for dog food was also raised. This alternative was dismissed from further consideration due to logistical and financial difficulties of getting carcasses out of the backcountry and to a processing plant.

Summary of Environmental Consequences of the Alternatives				
Impact Issues	Alternative A No Action	Alternative B Eradication	Alternative C Control via Sterilization	Alternative D Control via Population Reduction
Vegetation	Continued loss and degradation of vegetative resources from rooting behavior and consumption forever. Short and Long term major impact.	<ul style="list-style-type: none"> <li>●Approx. .05 acre will be impacted by trap locations. Sensitive vegetation areas will be avoided. Short term minor impact.</li> <li>●Hunting activity, Short term minor impact.</li> <li>●Removal of new entries Long term negligible impact.</li> <li>●Cessation of pig damage Long term beneficial.</li> </ul>	<ul style="list-style-type: none"> <li>●Approx. .05 acre will be impacted by trap locations. Sensitive vegetation areas will be avoided. Short-term minor impact.</li> <li>●Capture and treatment of untrappable pigs in chaparral. Short and long term moderate impact</li> <li>●Continued pig damage. Short and long term moderate impact</li> </ul>	<ul style="list-style-type: none"> <li>●Approx. .05 acre will be impacted by trap locations. Sensitive vegetation areas will be avoided. Trapping would be an annual event. Short and long term minor impact.</li> <li>●Continued pig damage. Short and long term moderate impact.</li> </ul>
Fauna and Special Status Species	<ul style="list-style-type: none"> <li>●Continued competition for limited resources. Continued destruction of habitat forever. Short term moderate and long term major impact.</li> <li>●California condor no impact.</li> <li>●California Red-legged frog. Short term moderate and long term major impact.</li> </ul>	<ul style="list-style-type: none"> <li>●Presence of dogs. Short-term minor impact.</li> <li>●Sporadic use of hunter w/dogs. Long term negligible impact.</li> <li>●California condor and California red-legged frog. No impact</li> <li>●Cessation of pig damage. Long term beneficial</li> </ul>	<ul style="list-style-type: none"> <li>●Presence of dogs to capture 99% of pigs for treatment. Short term minor impact.</li> <li>●Sporadic use of hunters and dogs for new entries long term minor impact.</li> <li>●California condor. Short and long term negligible impact.</li> <li>●California red-legged frog, continued threat. Long term moderate impact</li> </ul>	<ul style="list-style-type: none"> <li>●No dog presence. No impact.</li> <li>●Continued pig presence. Short term and long term moderate impact</li> <li>●California condor, seasonal food supply, short and long term minor beneficial impact.</li> <li>●California red-legged frog, short and long term moderate impact.</li> </ul>
Geologic Resources: Soils, and Streams	Continued disturbance, erosion and siltation forever. Short term and long term moderate impact	<ul style="list-style-type: none"> <li>●No traps will be located in sensitive areas; holes from stakes will be filled when traps removed. Short term negligible impact.</li> <li>●Cessation of pig damage. Long term beneficial</li> </ul>	<ul style="list-style-type: none"> <li>●No traps will be located in sensitive areas; holes from stakes will be filled when traps removed. Potential for greater pig activity in traps, Short term moderate and long term minor impact</li> <li>●Continued pig damage long term minor impact.</li> </ul>	<ul style="list-style-type: none"> <li>●No traps will be located in sensitive areas, holes from stakes will be filled when traps removed. Annual need to trap. Short and long term minor impact.</li> <li>●Continued pig damage short and long term minor impact.</li> </ul>
Wilderness	No impact from human activity	<ul style="list-style-type: none"> <li>●Human presence for 3 years, Short term minor impact.</li> <li>●Capture traps. Short term minor impact.</li> <li>●Sporadic hunting for new entries. Long term negligible impact.</li> <li>●Use of dogs. Short term minor impact.</li> </ul>	<ul style="list-style-type: none"> <li>●Human presence for 5 years. Short term minor impact.</li> <li>●Visual intrusion from capture traps. Short term minor impact</li> <li>●Added noise from dogs and pigs during 99% treatment. Short term moderate impact.</li> <li>●Sporadic treatment for new entries. Long term minor impact.</li> </ul>	Human presence annually for trapping to control population. Short term and long term minor impact
Cultural Resources	Continued disruption of sites, undermining of buildings and walls. Short and long term minor impact	<ul style="list-style-type: none"> <li>●No traps located in sensitive areas. No impact.</li> <li>●Cessation of pig damage. Long term beneficial impact.</li> </ul>	<ul style="list-style-type: none"> <li>●No traps located in sensitive areas. No impact.</li> <li>●Continued pig damage to cultural resources. Short term and long term minor impact.</li> </ul>	<ul style="list-style-type: none"> <li>●No traps located in sensitive areas. No impact.</li> <li>●Continued pig damage to cultural resources. Long term minor impact.</li> </ul>
Visitor Recreation & Experience	Continued destruction of visitor facilities and degradation of resource experiences. Short and long term moderate impact.	<ul style="list-style-type: none"> <li>●Presence and sounds of hunters and dogs in a monument, project will halt on weekends, holidays and spring break. Hunters will use silencers. Short term minor impact.</li> <li>●Sporadic presence of hunters and dogs for new entries. Long term negligible.</li> <li>●Noise from dogs and helicopters. Short term minor impact.</li> <li>●Cessation of pig damage. Long term beneficial impact.</li> </ul>	<ul style="list-style-type: none"> <li>●Intensive visitor education to accept certain amounts of resource destruction as "natural" for 20-27 years. Short and Long term moderate impact.</li> <li>●Presence and sounds of hunters and dogs in monument for 5 years. Long term minor impact.</li> <li>●Continued pig damage. Long term moderate impact.</li> </ul>	<ul style="list-style-type: none"> <li>●Annual presence of hunters within monument. Hunters will use silencers to minimize sound of guns. Ongoing need for visitor education. Short and Long term moderate impact.</li> <li>●Continued pig damage. Long term moderate impact.</li> </ul>
Water Quality	Continued disturbance of soils from pig activity in water areas (wallowing as well as rooting) adding to siltation and degradation forever. Short and Long term minor impact	<ul style="list-style-type: none"> <li>●No traps placed in streams or on banks. No impact.</li> <li>●Cessation of pig damage. Long term beneficial impact.</li> </ul>	<ul style="list-style-type: none"> <li>●No traps placed in streams or on banks. No impact.</li> <li>●Treatment in traps will increase ground disturbance increasing potential for siltation, erosion and runoff. Short term minor impact.</li> <li>●Continued pig damage. Long term minor impact.</li> </ul>	<ul style="list-style-type: none"> <li>●No traps placed in streams or on banks. No impact.</li> <li>●Traps will be deployed annually. Short term negligible impact.</li> <li>●Continued pig damage. Long term moderate impact.</li> </ul>
Cumulative Effects	Never ending degradation and alteration of resources from unrestricted pig activities. Short and Long term major impact.	<ul style="list-style-type: none"> <li>●Eliminates pig impact in shortest timeframe. Short project duration mitigates human impacts. Short-term minor impact.</li> <li>●Sporadic hunting for new entries. Long term negligible impact.</li> <li>●Cessation of pig damage. Long term beneficial impact.</li> </ul>	<ul style="list-style-type: none"> <li>●Obligates Pinnacles management to a long term commitment to ensure all entries to Pinnacles are sterilized shortly after entry. Short and Long term major impact.</li> <li>●Continued pig damage. Long term major impact.</li> </ul>	Continued degradation of resources from pig activity. Inadvertent selective breeding for smarter pigs. Capture rate declines within 2-3 years. Short and Long term moderate impact.

## ENVIRONMENTAL CONSEQUENCES

The following section identifies the environmental impacts associated with the proposed alternatives. Associated with each impact issue is a classification of the impact.

No impact means the alternative would not have any measurable effect to the identified resource.

Negligible impact implies the alternative would have an effect that could be measured but would not have any meaningful effect on the resource. An example would be trimming a few branches off a tree.

Minor impacts can be measured and are meaningful, but are small in scale, both in time and area. Typically, small time scales would be less than 4 weeks. A small area would be less than 10 acres or less than 10% of the resource, if that resource occupies less than 100 acres within the monument. Minor impacts are of short duration and small scope, and the timing and placement does not overlap sensitive times (e.g. breeding season for an animal or times of water flow for streams) or sensitive places (e.g. nest area or wetland).

Moderate impacts begin to affect larger processes and are typically larger in scale, either in time (up to 4 years) and/or in space (10 to 100 acres or 10 to 30% of the resource) or affect sensitive times.

Major impacts affect the larger processes, have a large scale (more than 100 acres or 31% of the resource) and last for a long time (more than 4 years after the project is complete) and overlap sensitive aspects for the resource. Impacts are classified as impairment if in the long-term the action would prevent the process from behaving naturally and would lead to degradation of the resource under evaluation. The Organic Act of 1916 prohibits the National Park Service from implementing any action that causes impairment.

Impacts are identified on two time scales – short and long term.

Short-term impacts occur during the active portion of the alternative (e.g. during the construction period). Short-term impacts are either self-eliminating (e.g. there is no dust created as soon as construction is completed) or can be corrected shortly thereafter by mitigation (e.g. trees were removed for construction but replacement trees were planted and would restore the area in the long term).

Long-term impacts typically begin once the active project is complete (e.g. the construction of a campground would in the long term increase visitor use. Long-term impacts continue past the active portion of the alternative for at least the foreseeable future, 15-20 years, and potentially longer. If the alternative establishes an activity that would continue into the foreseeable future (e.g. the creation of a permit system), then the impacts of the active portion would be considered in long term impacts as well as short term impacts.

### Alternative A

This alternative would maintain the current management of feral pigs, which means that no action would be taken to control or eradicate pigs from monument lands.

Vegetation: Feral pigs repeatedly root and otherwise disturb significant areas along riparian corridors and throughout oak woodland and oak savanna habitats at Pinnacles. Research indicates that the rooting and foraging activities of feral pigs are drastically limiting oak seedling survival and tree regeneration potential and reducing above ground biomass production. Rooting also facilitates the spread of invasive and noxious plants in oak woodlands by repeated disturbance to plant communities and may weaken these ecosystems sufficiently to increase susceptibility to diseases. The oak-savanna and riparian areas are considered threatened habitats by the California Native Plant Society and CDFG. There are 1,635 acres of oak



woodland and 381 acres of riparian habitat within the fenced area, 100% of each is impacted by pig activity.

Feral pigs are voracious eaters. In a single feeding, one pig can root up and devour as much as 15 acres. At Pinnacles, pigs have rooted up and devoured bulb fields that have taken decades to grow. Local populations of wild flowers have been destroyed. In as much as this is normal behavior for pigs, they will continue to destroy vegetative populations. Pig rooting and foraging also severely disturbs surface soil, causing soil moisture to be lost and creating bare soil for the expansion of exotic, invasive weeds. Plant regeneration patterns are also disrupted.

Wallowing in surface pools facilitates the transmission of seeds that attach to the hairy hide of pigs depositing them into an optimal environment for sprouting and growing. Riparian habitats are a scarce precious habitat at Pinnacles making up less than 2% of the land area. Pig rooting activity along stream banks disturbs and/or destroys the roots and supporting soil structure of these habitats. Without the supporting riparian habitat, frogs, salamanders and other small wildlife have no refuge. The No Action alternative poses both short term and long term major impacts to vegetation which are cumulative and would likely lead to impairment of the vegetation ecosystems of Pinnacles.

If this is the selected action, the vegetation study would either need to be highly modified or may be discontinued as there would be no practical way to make disturbed/reduced disturbance/undisturbed comparisons. The data gathered by this study would provide needed information on the feasibility of building and maintaining a perimeter fence then eradicating feral pigs within to protect and preserve biotic and abiotic resources. This would be a long term moderate impact.

Fauna: Species richness and diversity is high at Pinnacles. Feral pig behavior threatens species through direct consumption as in the case of frogs, salamanders, snakes, rodents, worms, grubs and insects as well as through habitat disruption and destruction. Streams and surface water pools are favorite wallowing and rooting locales. In addition to polluting the water, this behavior puts undue stress on the other species dependent on water to sustain their habitats and lives.

These impacts cascade through the food chain through reduction of food and water resources that support the birds and animals. Through the cumulative effect of loss of supporting vegetation, reduction in habitat, loss of habitat, change in vegetative cover due to increased invasive plant establishment, and degradation of water resources, the stage is being set for modification of the Pinnacles ecosystem over time. Given that NPS enabling legislation mandates preservation of these systems unimpaired for the enjoyment of future generations, this alternative poses both short term moderate impacts from daily losses and long term moderate to major impacts which are cumulative to the fauna and species diversity of Pinnacles and would likely lead to impairment.

Special Status Species: Pinnacles provides potential habitat for approximately 35 Species of Special Concern/Threatened Species/Endangered Species in San Benito County (Appendix A). Of these species, the California red-legged frog is the threatened/endangered species that would be impacted directly by this alternative. Pinnacles currently has an active reintroduction program for the California Red-legged frog which is hindered by the No Action alternative. This alternative impacts the red-legged frog primarily through habitat destruction caused by rooting and wallowing behavior along stream banks and in streams and secondarily through consumption. Continued pig damage poses a short term moderate impact on a daily basis and long term major impact from direct consumption and habitat loss for the red-legged frog which would likely lead to impairment.

Geologic Resources - Soils and Streams: Erosion is a significant impact to the soils and streams at Pinnacles. The rooting behavior loosens the soil around rocks accelerating the affects of rain-induced soil

erosion. When this behavior occurs along stream banks, the natural erosion action of stream flow is further accentuated because the soil is no longer stable. Once ground support of boulders is eroded beyond stability, they start moving. While this is a natural part of physical processes, pig activity has the potential to speed up this process. Coupled with frequent seismic activity and heavy rain events, over time this would adversely impact geologic resources.

Additionally rooting behavior fluffs the soil leading it to dry out which changes its composition and structure. Once this has happened, the soils no longer can provide the nourishment and structural support native vegetation requires for life. The soils become disturbed and are more susceptible to wind erosion and/or greater water erosion.

The additional sediment caused by loosened soil increases turbidity during all run-off events, large or small, impacting streams. Secondly, this impacts riparian and wetland habitats due to increased siltation. Stream banks are subject to increased erosion which influences stream channel characteristics and changes stream flow patterns that also have secondary impact to riparian habitats, wetlands and floodplains.

Left unchecked over time, these factors would disrupt the natural physical processes for park geologic resources. Preservation of these resources for scientific value for future generations is specifically why Pinnacles was established. NPS management policy is to maintain all the components and processes of naturally evolving park ecosystems, thus to let feral pigs continue to root and wallow would allow degradation of the resource. Continued pig damage poses both short term and long term moderate impacts and would likely lead to impairment.

Wilderness: The No Action alternative causes no human alterations to Pinnacles' wilderness. Pig damage would continue but wilderness definition does not include impacts from non-human sources. This alternative would cause neither impact nor impairment from human sources to wilderness.

Cultural Resources: The known Native American sites at Pinnacles suggest it was used as a seasonal camp area. The main potential for pig damage is from rooting behavior disturbance of known and unknown sites. Continued pig damage poses both short term and long term minor impacts.

Other cultural resources found at Pinnacles include pioneer homesteads and the extensive trail system and historic structures and features built by CCC crews during the 1930s, and the cultural landscapes that, collectively, these cultural resources represent. These resources reflect a unique timeframe in American history. Feral pig rooting behavior endangers these resources. Rooting along the rock edges of the trails destroys the trails and requires historically accurate restoration techniques to repair. The same activity undermines rock walls, bridge abutments, culverts, and building foundations. Repair and restoration of these resources is challenging due to the need to match and replace dislodged rocks, reproduce compatible mortar materials, replicate building techniques, plus the difficulty of the location and getting materials/equipment up steep, winding trails to the sites. While these can be repaired, with each repair another bit of history is compromised. While no impairment of the resources is likely, continued pig damage poses a short term minor impact and a long term minor impact.

Visitor Recreation and Experience: Visitor enjoyment of Pinnacles' unique resources is diminished as a result of feral pig activity. Picnic areas, generally located under oak trees for shade and visitor comfort, are favored rooting locations. Trails become unsafe after pigs have rooted along them turning over rocks and loosening dirt, accelerating erosion problems and increasing the frequency of required maintenance. Visitors notice and comment on pig damage to rock walls, culverts and other structures. Although some visitors may want to see pigs in the wild, they do not want to see the damage they cause to the ecosystem and cultural resources. There is an expectation that park managers should do something to prevent the damage and destruction of natural resources and facilities.

In general pigs will run away if approached by people, however, some pigs are not afraid of people and may become aggressive when humans encroach too closely. Motor vehicle accidents involving pigs are also a safety concern. Although these impacts are negligible at present, the ever increasing number of visitors and pigs increase the likelihood of negative human vs. pig interactions.

Continued pig damage poses both short term and long term moderate impacts to visitor enjoyment of Pinnacles' resources.

Water Quality: Feral pigs degrade water quality by wallowing in shallow surface waters. Besides wallowing, pig families tend to congregate along streams to forage and root disturbing vegetation leading to stream bank destabilization. Much of the year surface water is a scarce and precious resource at Pinnacles. Water resource impacts extend beyond erosion and siltation since all wildlife depends on water as well. Continued pig damage poses both short term and long term minor impacts but would not lead to impairment.

Cumulative Effects: Individually each impact described above may be limited, however, when these activities are added together with other pig activity in San Benito and Monterey Counties, the cumulative effect of feral pigs on natural resources is not recoverable. Unabated, these actions will gradually alter the environment. Long term impacts may include the loss of the oak woodlands and riparian habitats, loss of native flower and bulb fields, shift from native to non-native plants, destruction of frog and amphibian habitat, increased erosion, and destruction of cultural resources. Additionally this could alter the food chain through competition and loss of small mammals, which in turn will alter the larger animal and bird populations dependent on these resources. Pinnacles' legislated mandate is to preserve the park's resources unimpaired for the benefit of future generations. If allowed to continue unabated, the cumulative results of feral pig activities would pose short term major impacts and create long term major impacts to natural resources.

### **Alternative B**

Alternative B is both the environmentally preferred alternative and the park's preferred alternative as it is as the most effective, most viable, and least intrusive management tool available given present technology. This alternative would protect a significant portion of Pinnacles' land and resources from continued pig damage in the shortest time frame. It is estimated that 80-90% of the pigs will be caught in the capture traps, leaving the remaining 10-20%, known as untrappable pigs, to be removed by dog-assisted hunting.

Vegetation: Placement of the capture traps would occupy approximately 150 square feet of vegetation (traps are 10 ft by 10 ft) at different locations around the monument. Trap placement will avoid sensitive plant locations and sensitive habitats. Vegetation in these areas would be trampled by pigs during the trapping phase. Due to the small total area of ground impacted (approximately .05 acre) and the short duration, this is a short term minor impact.

If fence breaches allow large numbers of pigs to re-enter the protected area, trapping may be used to catch the new entrants. Since this would be an infrequent, irregular event, it would be a long term negligible impact.

Hunting activity may impact vegetation when dogs are used to flush out the remaining untrappable pigs. Chaparral vegetation provides protective cover for feral pigs when they are not actively engaged in the search for food. Dogs would follow the animal tunnels under the chaparral, but humans would face a greater challenge. Dense chaparral, which covers a significant portion of the park, would require bush-whacking to cut a trail which would inflict damage to the vegetation. High powered rifles would be used to shoot the pigs flushed by the dogs which minimizes how much chaparral the hunter would have to work

through. While it is recognized that some vegetation will get damaged in the final stages of the eradication program, impacts would be minor and the environment would quickly recover. This would be a short term minor impact and not lead to impairment.

The vegetation study will have 3 kinds of plots established - rooting disturbance transects, vegetation plots for monitoring changes in plant community characteristics, and seedling/tree regeneration potential transects. Plots will be in close proximity to each other but cannot be co-located on top of one another due to impacts on data collected. These plots will be used to evaluate the effects of reduced feral pig rooting disturbance on plant species diversity and relative abundance. Data resulting from plot analyses will be used to estimate a variety of plant community characteristics; absolute and relative cover for each plant species, plant species richness, evenness, species diversity, spatial plant community diversity. Although there may be short term trampling and loss of vegetation due to the sampling techniques, this would be a long term beneficial impact due to the knowledge we would gain from the data collected.

Cessation of ongoing pig damage to vegetative resources would be a long term beneficial impact.

Fauna: Once all trappable pigs have been caught, hunters will utilize dogs to find the remaining pigs. The dogs will have demonstrated their ability to stay on scent prior to being brought in to minimize the likelihood of other wildlife being chased. The dogs will have shock collars to keep them focused on the pigs. Hunter and dog use patterns would be varied during the hunting phase so pigs do not develop sensitivity to the patterns. Given the short duration (1-3 days per area, 2 weeks at a time with a break between hunting sessions) this would be a short term minor impact.

If fence breaches allow pigs to re-enter the protected area, hunting may be used to eliminate the new entrants. Since this would be an infrequent, irregular event, it would be a long term negligible impact.

Dogs will be used to capture the untrappable pigs. NPS regulations generally prohibit dogs from national parks but their use as service animals or as a tool to accomplish a resource objective are permitted. The scent of dogs disturbs the native carnivores and causes changes in native species' territories and use patterns. Use of dogs will be limited in duration thus would be a short term minor impact.

Implementation of this alternative would not lead to impairment.

Cessation of ongoing pig damage to wildlife resources would be a long term beneficial impact.

Special Status Species: The California condor is the endangered species potentially impacted by the implementation of this alternative. Pinnacles is a reintroduction site for California condors. To minimize disturbance of this species, no traps will be placed in the vicinity of the release facility. Since the carcasses will be dispersed to the environment and condors are carrion feeders, the use of specialized non-lead bullets will be required. As an additional mitigation measure, as much as feasible, the slugs/shrapnel will be removed from the pigs prior to carcass dispersal. With these mitigations, there would be no impact to the California condor.

There would be no human caused impacts to species of special concern as listed in Appendix A resulting from the implementation of this alternative.

Cessation of ongoing pig damage to special status species would be a long term beneficial impact.

Geologic Resources-Soils and Streams: No capture traps will be situated in sensitive areas, and holes from stakes will be filled in when traps are removed. Impact of trapping will be short term and negligible and would not lead to impairment.

Wilderness: Human presence may be noticeable for 3 years. While active trapping is occurring, it is likely that 2-3 individuals will be camping near the capture traps to minimize the time the pigs spend trapped and to facilitate prompt euthanization of trapped pigs as well as hunter safety. Hunting the untrappable pigs may also necessitate camping due to the lack of vehicle access to much of the area and because the ideal times for hunting pigs are late evening and early morning hours. This activity would be occasional and of short duration, approximately 2-3 days each stay. Additionally, trapping and hunting would take place only during mid-week and non-holiday periods to minimize visitor exposure, thus this is considered a short term minor impact.

The capture traps would create a human caused visual intrusion in wilderness areas. Location of the catch traps will be off-trail and out of trail viewsheds as much as possible. All capture traps will be removed after trappable pigs are caught. Additionally there may be occasional (1-3 days dispersed) sound of helicopters in the wilderness when traps are located or moved. This is considered a short term minor impact.

There may be added human and dog sounds to the wilderness environment. Hunters will use silencers on their guns when shooting. To mitigate this impact, hunting and use of dogs would only be during the week to minimize visitor exposure reducing this to a short term minor impact.

New pig entries may necessitate hunter presence for a few days on a sporadic basis. Due to the likely short duration of such events, this is considered a short term negligible impact and would not lead to impairment.

The vegetation study will place approximately 216 pieces of rebar in 108 plots on a permanent basis. The majority of these plots are likely to be outside wilderness boundaries. Due to the need to exactly re-locate the study plots from year to year, rebar is the best available technology currently available. GPS and photographic location can get close to the same spot but not exactly and would require installation and removal of markers each time to stretch a meter tape tightly between so the plot locations could be re-established for survey each time. Access to these areas will be carefully chosen using existing human and animal trails as much as possible to prevent social trails from appearing and to minimize erosion and other degradation. The researchers will be briefed on wilderness protocols. This is a long term minor impact.

Cultural Resources: Placement of capture traps will be located to avoid cultural resources. There would be no impact to cultural resources from trap placement. If any cultural or archeological resources are discovered when installing the capture traps, work will cease and cultural resource specialists will be brought in to evaluate the site.

Cessation of ongoing pig damage to cultural resources would be a long term beneficial impact.

Visitor Recreation and Experience: For 3 years, Pinnacles staff would have to educate visitors about the eradication program. Week day visitors may have an unusual experience of meeting a professional hunter possibly with dogs on park trails in the very early morning hours or very late evening hours, however this is unlikely due to Pinnacles' operating hours. A backcountry hiker may come across a capture trap that may have live animals in it or a hunter's camp. Posting signs on the traps would be a possibility to cover this unusual event. It is possible that visitors may notice smells and/or find carcasses. Since trapping and hunting activities will be focused during the summer months when visitation is light and stopped on weekends, holidays and during spring break, it is anticipated that the majority of visitors will not be aware

the program is being pursued. Occasional trail closure may be needed to ensure visitor and employee safety during hunting periods. This is considered a short term minor impact.

Weekday visitors may hear helicopters delivering or retrieving capture traps (1-3 days of helicopter use per active project year), gunshots or the barking of dogs on scent. Hunters will use silencers to minimize the sound of the gun and visitor education will explain the presence of dogs. Since there will be no work done on weekends, holidays or during spring break, it is anticipated that the majority of visitors will be unaware that the program is being implemented.

This is considered a short term minor impact.

This alternative provides for visitor education during the 3 years of the active program. Unless there is a large section of fence lost, visitors will never see the same level of intense pig activity in the fenced portion of Pinnacles again. Since this alternative will stop pig damage within the protected area, visitors will experience a gain from picnic areas and trails no longer being routinely disturbed. This would be a long term beneficial impact.

Water Quality: Placement of capture traps will be such that water quality would not be affected by the traps or as a result of pig activity in the traps. There would be no impact to water quality from this alternative.

Cessation of ongoing pig damage to vegetative resources would be a long term beneficial impact.

Cumulative Effects: Regionally and nationally, this alternative learns from and builds on science, skills and abilities developed on other public lands with similar pig problems, promoting intra- and interagency information sharing. Also it improves those resource management databases through incremental additions of practical and scientific knowledge gained as results of this plan. The cumulative gains in knowledge would lead to the long term improvement of ecosystems through the control of feral pigs in other areas. If implemented as proposed, Alternative B would generate long term beneficial impacts.

### **Alternative C**

This alternative would use the same basic methods as described in Alternative B for capturing the pigs. Pigs would be injected with a chemical sterilant and indelibly marked either by distinctive ear clipping or tail cutting to distinguish between treated pigs and untreated pigs. Since not all pigs are trappable, administering of the sterilant and marking would require shooting the pigs with a tranquilizer, tracking them until the tranquilizer takes effect, then completing the process. The anticipated active duration of this alternative after drug development is achieved would be  $5 \pm$  years to capture and treat every pig within the fence.

Vegetation: Placement of the capture traps will necessitate removal of approximately 150 square feet of vegetation (traps are 10 ft x 10 ft) at different locations around the monument. Placement will avoid sensitive plant locations and sensitive habitats. Vegetation in these areas would be trampled by pigs during the trapping, injecting, and marking phase. This would impact approximately .05 acre in the initial capture and treat phase, and somewhat smaller areas in subsequent management phases required as breaches are discovered and new entries need to be caught and treated. This would be a short term minor impact.

In this alternative, 80-90% of the pigs are captured, treated then released from the traps. The remaining 10-20% untrappable pigs will still run with the treated pigs requiring picking the untreated pigs out of the herd for darting and treatment. Treating the untrappable pigs would require the hunter and dogs to repeatedly flush pigs from hiding, then determine if all flushed were treated, target any untreated and try to capture the untreated for treatment. Dogs would have to flush out the pigs so the hunter could find his/her target pig,

dart it with a tranquilizer then the dogs would have to follow the pig through the chaparral vegetation until the tranquilizer takes effect (approximately 3 minutes-2 hours for the fastest acting tranquilizer currently available, depending on where the pig is hit). Then the hunter would have to make his/her way through the chaparral to the pig to perform the injection and marking. In chaparral vegetative cover, the dogs may be able to follow the pig but the human will be unable to keep up due to the very dense, intertwined nature of the vegetation. Once the dogs have found the downed pig, the easiest way for the human to get to the pig would most likely be to crawl through the “animal tunnels” under the vegetation. Crawling makes it easier to get through the chaparral, but the hunter would still experience many scratches, cuts and bruises crawling over stony soils and through the brush. Cutting a trail to the animal would be very difficult and time consuming, would still result in potential injury to the hunter, would cause serious resource damage, and still it is doubtful that the hunter could reach the pig in a timely manner. The challenge to successfully flush, inject and mark every pig in chaparral vegetation is extremely difficult, and may cause the death of several of the pigs. Because this alternative puts both humane treatment of pigs and safety of the humans at risk in ways that cannot be mitigated and would have to be repeated whenever new pigs entered through fence breaches, it would pose both a short term and long term moderate impact and not likely to lead to impairment.

If this is the selected action, the vegetation study would either need to be highly modified or may be discontinued as there would be no practical way to make disturbed/reduced disturbance/undisturbed comparisons. The data gathered by this study would provide needed information on the feasibility of building and maintaining perimeter a fence then eradicating feral pigs within to protect and preserve biotic and abiotic resources. This would be a long term moderate impact.

Fauna: After all trappable animals are caught, treated, and released; hunters would utilize dogs to flush out remaining pigs so they could be shot with tranquilizers and treated. This would require more extensive use of dogs than Alternative B since once a pig was shot with a tranquilizer, dogs would have to stay on the pig trail until it is found and bark until the hunter arrives. Also the hunter would have to distinguish between already treated pigs flushed and untreated pigs in amongst them and just target the untreated since 99% treatment is a required component for this alternative. This much hunting activity may disturb local wildlife. Time of day, month of occurrence and frequency of occurrence would determine whether this disturbance would alter wildlife patterns. Best case scenario would necessitate repetition of this process as many as 100 times to treat initial untrappable pigs. New entries through breaches would require occasional recurrence. Because of the increased presence and scent of dogs it would be likely that some wildlife would be displaced. This would have both a short term and long term minor impacts and would not likely lead to impairment.

Special Status Species: Pinnacles is a reintroduction site for California condors. To minimize disturbance of this species, no traps in the vicinity of the release facility will be permitted. There would be an increased presence of humans and dogs for the 5± years required for implementation of this proposal to the 99% capture/treatment level. It is unknown what reactions the condors would have to this situation. Due to the 5 ± year duration of this alternative, this would pose both a short term and long term negligible impact.

Other protected raptor species may be impacted. If flushing out of untrappable pigs occurred during nesting season, the presence and sounds of dogs may disturb the birds sufficiently to cause nest failure. Several areas of Pinnacles are under voluntary seasonal closures to protect nesting raptors from human-caused disturbance. Where possible, the proposed action would respect these closures. These impacts are unknown and best management practices would be to schedule hunting untrappable pigs at non-nesting times, so with this mitigation, the impact would be long term negligible.

California Red-legged frogs and other species of special concern would remain threatened by pig activity until all the pigs had lived out their natural lives. Best case scenario would have the majority of the initial

pigs dying off by the 20<sup>th</sup> year of the proposed project and minimal carryover due to new entries which would be a long term moderate impact.

Geologic Resources-Soils and Streams: No capture traps would be placed in sensitive areas, and stake holes would be filled in when traps are removed. There would be more ground disturbance in the trap areas due to the need to isolate each captured pig for treatment. This would involve humans entering the trap which would increase pig movement just from human presence. Any increase in trampling the ground destroys vegetative cover and powders the soil surface. Once the soil surface is more than lightly disturbed it becomes more susceptible to erosion. Mitigations may include application of soil stabilizers to trap areas after the trap is removed. This would be a short term moderate impact. Capture and treatment of new entries would pose a long term minor impact but would not lead to impairment.

Wilderness: Human presence would be noticeable for approximately years. While active trapping is occurring, it is likely that 2-3 individuals will be camping near the capture traps to minimize the time pigs spend trapped, to facilitate prompt treatment and release of trapped pigs as well as hunter safety. Hunting the untrappable pigs may also necessitate camping due to the lack of vehicle access to much of the area and the ideal times for hunting pigs are late evening and early morning hours. Since this activity would be occasional and of short duration, approximately 2-3 days each stay, impacts would be minor and the environment would quickly recover. Additionally, since trapping and hunting can only take place during the week in order to minimize visitor exposure, this would be a short term minor impact. The presence of hunters and dogs would be required whenever a fence breach allowed new entries which would be a long term minor impact but would not lead to impairment.

The capture traps would create a human caused visual intrusion in wilderness areas. Location of the catch traps will be off-trail and out of trail viewsheds as much as possible. All catch traps will be removed after trappable pigs are caught. This is considered a short term minor impact.

There would be added human, dog and pig sounds to the wilderness environment during treatment. The skill and speed of the humans administering treatment will minimize this impact. Additionally the sounds of dogs on scent may be heard during flushing out and treating the untrappable pigs. Gun sounds in this alternative would not be noticeable since a tranquilizer dart which is air powered would be used. Additional mitigation for these impacts would be their use only during the week to minimize visitor exposure thereby reducing this to a short term minor impact and would not likely lead to impairment.

Cultural Resources: Placement of capture traps will be located to avoid cultural resources. There would be no impact to cultural resources from trap placement.

Continued pig activity has the potential to disturb unknown archeological sites. This would be a long term minor impact.

Continued pig activity will continue the disturbance and/or destruction of historic trails and facilities. This would be a long term minor impact and would not likely lead to impairment.

Visitor Recreation & Experience: Implementation of this alternative would require continuing visitor education for 20-27 years. Until effective chemical sterilants are developed (estimated 10+ years from present), education efforts would need to address continued degradation of park resources. Future interpretive information would need to be developed for the 5 ± year implementation program to inform visitors about how pigs will be caught, treated and physically marked and how dogs will be used to insure the capture of untrappable pigs. Although the program would be carried out during when visitation is lowest, park staff would need to inform visitors about the ongoing need for sporadic yet regular presence of hunters and dogs in the park when new entries have occurred. By the 20<sup>th</sup> year, interpretive information



would need to be revised to reflect the results of the program and its ongoing importance to maintain Pinnacles' resources in as un-impacted a condition as possible while allowing for the presence of non-native species. Due to the duration of these impacts, these would have both short and long term moderate impacts.

Water Quality: Placement of capture traps would be outside and away from water locations to minimize loosening of soils that would contribute to increased siltation. Due to the need to treat trapped pigs in a confined space, there would likely be an increase in erosion for the 5 ± years of initial treatment. This would be a short term minor impact.

Continued pig activity for 20-27 years would pose a long term minor impact but would not likely lead to impairment.

Cumulative Effects: Regionally and nationally, this alternative would contribute to the development of sterilization techniques for control of feral pigs. The benefits of this work would not be realized for many years based on the most current information available. Even more distant would be the beneficial effects in the ecosystem, due to the life span of pigs and the uncertainty of sterilization effectiveness. Since the pigs would continue damaging the ecosystem, and these activities would also be occurring outside the monument, the cumulative effect on the ecosystems in and around Pinnacles would be long term and moderate. Although others could learn from the work, the intensity of management necessary with these techniques would not likely be used elsewhere. Implementing this alternative would commit Pinnacles management and visitors to a long term acceptance of actions, which would cause the long term moderate decline of monument resources and be very costly to sustain over time. If implemented as proposed, Alternative C would generate long term moderate cumulative impacts.

#### **Alternative D**

Alternative D differs from Alternative B in that no hunting with dogs would ensue after capture. In Alternative D all trappable pigs are promptly euthanised and dispersed to the environment to return the nutrients to the ecosystem. Untrappable pigs would be left at large in the fenced portion of Pinnacles.

This would require the establishment of an annual trap/kill program to manage the feral pig population. Maintenance of the fence could be reduced to a bi-annual survey (or after natural disturbance events) rather than quarterly as this alternative requires an annual trapping program (June through August) to capture the most pigs.

Vegetation: Placement of the capture traps will necessitate removal of approximately 150 square feet of vegetation (traps are 10 ft x 10 ft) at different locations around the monument. Placement will avoid sensitive plant locations and sensitive habitats. This would impact approximately .05 acre annually. Capture traps would be moved around the monument to minimize vegetation impacts. This would pose both a short term and long term minor impact.

Pig activity would continue damage to sensitive vegetation and habitats. How trap sensitive the remaining pigs become and how fast the pigs will reproduce is not known. It is possible that there would be no measurable reduction in vegetative impacts with fewer pigs since it is unknown how they distribute themselves. It is possible that fewer numbers of pigs just allows for larger, better fed pigs. This would be a long term moderate impact and would not likely lead to impairment.

If this is the selected action, the vegetation study would either need to be highly modified or may be discontinued as there would be no practical way to make disturbed/reduced disturbance/undisturbed comparisons. The data gathered by this study would provide needed information on the feasibility of

building and maintaining perimeter a fence then eradicating feral pigs within to protect and preserve biotic and abiotic resources. This would be a long term moderate impact.

Fauna: This alternative results in continued competition between native wildlife and feral pigs as described in the No Action alternative. It is unknown if reducing the number of pigs will reduce impacts or if fewer pigs will eat the same amount. The same pig preferred areas would be rooted which would allow for continued impact on the smaller vertebrates and invertebrates. There would be no dogs utilized in capturing untrappable pigs. Due to the annual nature of this alternative, it would pose both short and long term moderate impacts and would likely lead to impairment.

Special Status Species: If this proposed alternative were implemented, impacts to California condors would be limited. Traps would be located away from the condor release site to minimize disruption. Non-lead bullets would be used to kill the captured pigs whose carcasses would then be returned to the environment. Since condors are carrion feeders, this alternative would provide a seasonal supply of food from June through August, this would be a long term minor beneficial impact.

California Red-legged frogs and other listed species of special concern would remain threatened by pig activity. As long as pigs remain within the fenced area, riparian habitat will be disturbed and destroyed and frogs would be eaten. It is unknown what frog response might be to repeated habitat destruction over a long period of time. This could pose both short and long term moderate impacts. Population decline may become evident over a long period of time which would not likely lead to impairment.

Geologic Resources- Soils and Streams: No capture traps would be placed in sensitive areas, and stake holes would be filled in when traps are removed. This would be an annually recurring event. This would pose both short term and long term minor impacts and would not lead to impairment.

Continued pig activity would continue to accelerate erosion over the natural process level. This would be a long term minor impact.

Wilderness: Human presence may be noticeable into the foreseeable future. While active trapping is occurring, it is likely that 2-3 individuals will be camping near the capture traps to minimize the time pigs spend trapped, and to facilitate prompt treatment of trapped pigs as well as hunter safety. The capture traps would create a human caused visual intrusion in wilderness areas. Location of the capture traps will be off-trail and out of trail viewsheds as much as possible. All capture traps will be removed after trappable pigs are caught. Traps would have to be set every year. This would be both a short term and long term minor impact and would not lead to impairment.

Cultural Resources: Placement of capture traps will be located to avoid cultural resources. There would be no impact to cultural resources from trap placement.

Continued pig activity has the potential to disturb unknown archeological sites. This would be a long term minor impact.

Continued pig activity will continue the disturbance and/or destruction of historic trails and facilities. This would be a long term minor impact.

Visitor Recreation & Experience: Implementation of this alternative would require ongoing and perhaps seasonally intensive visitor education about the trap/kill method of pig control, to explain the continued evidence of pig damage and the presence of traps.

Trapping would most likely occur during June-August during the week when visitation is low. The park would need to provide ongoing visitor information about the program. Summer visitors may encounter traps on their weekend hikes, these will be locked in the open position so no pigs are trapped and held inhumanely. Summer weekday visitors could encounter traps with pigs waiting for the return of the hunter. Hunters will use silencers to help mitigate the sound of gunshot within the park. Since resource damage would continue if this alternative is implemented, visitors would continue to experience some level of pig-caused resource degradation. Visitors would still experience disturbed trails and picnic areas and it would still appear that the park was allowing the pigs to continue to degrade resources. This would be both a short term and long term moderate impact.

Water Quality: Placement of capture traps would be outside and away from water locations to minimize loosening of soils that would contribute to siltation. This would pose a short term negligible impact.

Continued pig activity will continue erosion and siltation impacts to water resources. This would be a long term minor impact.

Cumulative Effects: Over time feral pigs would remain at large within the fenced area of Pinnacles. Resource degradation and destruction would continue although possibly on a reduced scale due to the smaller numbers of pigs. However, since feral pigs' prime rooting grounds are oak and riparian habitats, these sensitive areas may not experience a reduced scale of pig activity. Even with the annual 80-90% reduction in the number of pigs, the remaining 10-20% of the pigs would have unchallenged access to these prime areas, so these previously disturbed habitats may experience no recovery period and would continue to experience the same pattern of disruptions at the same times of the year. These disruption/disturbance patterns are already known to contribute to critical habitat loss both regionally and nation-wide. Since the pigs would continue damaging the ecosystem, and these activities would also be occurring outside the monument, the cumulative effect on the ecosystems in and around Pinnacles would be long-term and moderate.

Secondarily, this approach to reduction in pig population would function as a selective feral pig breeding program. This alternative permits the surviving pigs to roam and breed freely within the fenced area. These pigs would be the most evasive, trap sensitive, human-wary pigs (survivors of the previous years' control effort) that are reproducing every year. Learning from experience in other locations with feral pig issues, the efficacy of the capture rates would drop to average of 50-70% over time. If these pigs managed to escape from the monument, this program may lead to a population of pigs in the surrounding area which are more difficult to control. This would pose both short term and long term major cumulative impacts on the ecosystem.

## **ENVIRONMENTALLY PREFERRED ALTERNATIVE**

The environmentally preferred alternative promotes the national environmental policy expressed in National Environmental Protection Act (NEPA), section 101 b. This includes:

- Fulfilling the responsibilities of each generation as trustee of the environment for succeeding generations;
- Ensuring for all generations safe, healthful, productive, and esthetically and culturally pleasing surroundings;
- Attaining the widest range of beneficial uses of the environment without degradation, risk of health or safe, or other undesirable and unintended consequences;
- Preserving important historic, cultural and natural aspects of our national heritage and maintains wherever possible, an environment that supports diversity and variety of individual choice;
- Achieving a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities; and

- Enhancing the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

Alternative A does not meet any of the NEPA criteria since no action would allow continued pig damage which would cause both short and long term moderate and major impacts to vegetation, fauna, special status species, soils and streams, visitor recreation and experiences, and contribute to cumulative effects region-wide.

Alternative B is the most effective, most viable, and least intrusive management tool available given present technology. This alternative would protect a significant portion of Pinnacles' land and resources from continued pig damage in the shortest time frame and meets five of the six goals. Impacts generated by this alternative are all of short duration and negligible or minor in intensity, with the exception of the cessation of pig damage to monument resources which is a long term beneficial impact.

Alternative C would require development of effective sterilant drugs which would take approximately 10 years prior to any control measures being implemented; would require approximately 5 years to capture, treat, and permanently mark every pig within the fenced area once the drug is approved; would require extensive visitor education during the drug development and trapping phases (approximately 15 years) to explain the ongoing damage to resources; would require a different set of visitor education programs during the life span of the sterilized pigs while they continue to damage monument resources (approximately 7 years); and only partially meets the criteria of the NEPA goals.

Alternative D would establish a need for an annual hunt to keep the pig population at a very low level; would permit continued pig damage to monument resources at a lower impact level (minor to moderate); would function as a selective breeding program for smarter pigs. If selected this alternative would require congressional approval since Pinnacles' enabling legislation would have to be amended to permit annual hunting activity. This alternative does not meet the NEPA goals.

After careful review of potential resource and visitor impacts, and developing proposed mitigations for impacts to natural and cultural resources, the environmentally preferred alternative is Alternative B. Alternative B surpasses the other alternatives in best realizing the full range of NEPA goals as stated. Although other alternatives may achieve some level of individual protection for natural resources, Alternative B would 1) fulfill the responsibilities of each generation as trustee of the environment for succeeding generations; 2) assure for all generations safe, healthful, productive, and esthetically and culturally pleasing surroundings; 3) attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences; 4) preserve important historic, cultural and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice; and 5) achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities. Goal six is not directly applicable to this project.

## CONSULTATIONS AND COORDINATION

Pinnacles National Monument has long been concerned about influence of feral pigs on park resources. Consultation with resource specialists in 1985 initiated construction of a pig-proof fence around what was then most of the monument lands (park boundary was significantly expanded in 2000). Nine public scoping meetings were held in the communities surrounding the park in October, 2001. They were Coalinga, Los Banos, Bear Valley Hall (near Pinnacles), Gilroy, Hollister, Campbell, King City, Soledad, Salinas. Public support was strong and no unexpected issues were raised.

### Principal Project Manager:

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B.S., M.S. Wildlife Biology, Certified Wildlife Biologist, 5+ years experience as lead wildlife biologist at PNM

**Document prepared by:** Karen Dennis, Environmental Protection Specialist; Amy Fesnock, Wildlife Biologist; Lisa Smith, Maintenance Supervisor (Trails); Jerry Case, Chief Ranger; Richard Bañuelos, Park Ranger, Interpretation & Visitor Services, all are with Pinnacles National Monument.

## REFERENCES and SUGGESTED READING

1916 NPS Organic Act - 16 U.S.C.

Redwood Act of 1978 - 16 U.S.C 1a-1

NPS 77 1973 Endangered Species Act - 7 U.S.C. 136 as amended

Executive Order 11312

National Park Service management policies - NPS 2001

PNM Master Plan 1975

East unit DCP 1993

Final Environmental Impact Statement, Channel Islands National Park, June 2002

Leopold et al. 1963 Wildlife Management in the National Parks. American Forestry.

DeBenedetti 1987. Management of feral pigs at Pinnacles National Monument: Why and How. Conservation and Management of Rare and Endangered Plants: Proceedings of the California Conference on the Conservation and Management of Rare and Endangered Plants: ed. by T. Elias. California Native Plant Society.

Barrett, R. H. 1999. Feral swine: the California experience. Available online at <http://www.texnat.tamu.edu/symp/feral/feral-15.htm>.

Singer, et al 1984. Effects of wild pig rooting in a deciduous forest. Journal of Wildlife Management.

Sweitzer et al, 2000: Estimating sizes of wild pig populations in the north and central coast regions of California.

**Appendix A – Species of Special Concern/Threatened Species/Endangered Species occurring within San Benito County and potentially occurring within Pinnacles National Monument.**

	Common Name	Scientific Name	Status	Present at Pinnacles	Affected by Project
<u>Insects</u>	Pinnacles shieldback katydid	Idiostatus kathleene	CSC*	Y	Y
	Pinnacles riffle beetle	Optioservus canus	CSC*	Y	Y
	Conservancy fairy shrimp	Branchinecta conservatio	FE 3	N	
	Longhorn fairy shrimp	Branchinecta longiantenna	FE 3	N	
	Vernal Pool fairy shrimp	Branchinecta lynchi	FT 3	N	
<u>Fish</u>	Sacramento Perch	Archoplites inerruptus	CSC*	N	
<u>Amphibians</u>	California tiger salamander	Ambystoma californiense	FC/CSC*1	P	
	Western spadefoot	Scaphiopus hammondi	CSC 2	H	
	California red-legged frog	Rana aurora draytonii	FT/CH	Y	
	Foothill yellow-legged frog	Rana boylei	CSC*2	H	
<u>Reptiles</u>	Southwestern pond turtle	Clemmys marmorata pallida	CSC*	Y	
	Silvery legless lizard	Anniella pulchra pulchra	CSC	Y	Y
	Coach Whip	Masticophis flagellum	CSC	H	
	Two-striped garter snake	Thamnophis hammondi	CSC	Y	Y
	Blunt-nosed leopard lizard	Gambelia silus	FE 3	N	
<u>Birds</u>	California condor	Gymnogyps californicus	SE/FE	+	Y
	Cooper's hawk	Accipiter cooperi	CSC	Y	**
	Sharp-shinned hawk	Accipiter straitus	CSC	Y	**
	Bald Eagle	Haliaeetus leucocephalus	FT	Y	**
	Golden eagle	Aquila chrysaetos	CSC	Y	**
	White-tailed kite	Elanus leucurus	CSC	Y	**
	Prairie falcon	Falco mexicanus	CSC	Y	**
	Peregrine falcon	Falco peregrinus	SE/FE	Y	**
	Long-eared owl	Asio otus	CSC	Y	**
	Mountain Plover	Charadrius montanus	FC 3	N	
<u>Mammals</u>	Pallid bat	Antrozous pallidus	CSC	Y	
	Townsend's big-eared bat	Corynorhinus townsendii	CSC*	Y	
	Western mastiff bat	Eumops perotis californicus	CSC*	Y	
	Big-eared kangaroo rat	Dipodomys elephantinus	CSC*	Y	
	American badger	Taxidea taxus	CSC	Y	
	San Joaquin kit fox	Vulpes macrotis mutica	FE 3	N	
	San Joaquin Valley woodrat	Neotoma fuscipes riparia	FC 3	N	
<u>Plants</u>	San Benito evening primrose	Camissonia benitensis	FT3	N	
	Hoover's eriogonum	Eriogonum hooveri	FT3	N	
	San Joaquin woolly-threads	Lembertia congdonii	FE3	N	

**Key:**

CSC =California Species of Special Concern

F = Federal

S = State

CH = Critical Habitat

E =Endangered

T = Threatened

C = Candidate

\* = Category 1 and 2 species before revoked in 1996

1 (P) = occur around Pinnacles and have habitat within Pinnacles, but have not been confirmed

2 (H) = historically occurred in Pinnacles, but are believed to be locally extirpated

3 = unlikely to occur in Pinnacles, never confirmed and appropriate habitat not available

\*\* Secondary impact due to disruption of food chain

# MINIMUM REQUIREMENT ANALYSIS WORKSHEET PINNACLES NATIONAL MONUMENT



PINN-160 (5/2003)

PROPOSED ACTION: Feral Pig Eradication DATE: April 2003

LEAD PERSON(S): Amy Fesnock WORK UNIT(S): Resources

## PART A: Minimum Requirement (should the action be done in wilderness)

<b>1</b>	IS ACTION AN EMERGENCY?
----------	-------------------------

YES

NO

ACT ACCORDING TO  
APPROVED EMERGENCY  
MINIMUM TOOL CRITERIA

<b>2</b>	CAN ACTION BE ACCOMPLISHED OUTSIDE OF WILDERNESS AND STILL ACHIEVE ITS OBJECTIVES?
----------	--

YES

NO

DO IT THERE

<b>3</b>	DOES ACTION CONFLICT WITH LEGISLATION, PLANNED WILDERNESS GOALS, OBJECTIVES OR FUTURE DESIRED CONDITIONS?
----------	---

YES

NO

DO NOT DO IT

<b>4</b>	IS ACTION PRE-APPROVED BY THE WILDERNESS AND BACKCOUNTRY OR OTHER PARK MANAGEMENT PLAN?
----------	---

YES

NO

DO ACCORDING TO  
APPROVED CRITERIA

<b>5</b>	CAN ACTION BE ACCOMPLISHED THROUGH A LESS INTRUSIVE ACTION THAT SHOULD BE TRIED FIRST? (Visitor Education...)
----------	---

Answer: ☐ Yes ☒ No

Explain:

Answer: ☐ Yes ☒ No

Explain: Pigs occupy all habitat types. Hunting is the most effective eradication procedure and will need to be conducted in wilderness as well as other park areas.

Answer: ☐ Yes ☒ No

Explain: The action will support NPS founding legislation, supports wilderness goals and objectives in which both habitat and species will reflect a more native balance within the ecosystem. Pigs are introduced animals to this ecosystem and are extremely destructive to it.

Answer: ☐ Yes ☒ No

Explain: Pinnacles wilderness plan is in development. Park management has included this action in its planning process since 1985 when it began construction on a pig fence around what was then the park boundary as a first step management tool for feral pigs. Now that the fence will be completed, phase II, eradication management is being developed.

Answer: ☐ Yes ☒ No

Explain: Pigs cannot be relocated to other land, CDFG regulations would be violated. Chemical sterilization is undeveloped for pigs. Just

YES

NO

DO IT

DO PART B

Page 1 of 2

**PART B: Minimum Tool (how the action should be done in wilderness)****6**

DESCRIBE, IN DETAIL, ALTERNATIVE WAYS TO ACCOMPLISH THE PROPOSED ACTION \*

(These may include, primitive skill/tool, mechanized/motorized, and/or combination alternatives)

(Use addition pages if necessary)

GO TO NEXT STEP

**7**

EVALUATE WHICH ALTERNATIVE WOULD HAVE THE LEAST OVERALL IMPACT ON WILDERNESS RESOURCES, CHARACTER AND VISITOR EXPERIENCE \*\*

GO TO NEXT STEP

**8**

SELECT AN APPROPRIATE, PREFERRED ALTERNATIVE

IF

REQUIRED

**9**

ATTACH TO APPROPRIATE PROJECT PROPOSAL/CLEARANCE FORM FOR REVIEW AND APPROVAL/DISAPPROVAL SIGNATURE

\* Minimum questions to answer for each alternative:

What is proposed?  
Where will the action take place?  
When will the action take place?  
What design and standards will apply?  
What methods and techniques will be used?  
How long will it take to complete the action?  
Why is it being proposed in this manner?  
What mitigation will take place to minimize action impacts?

\*\* Minimum criteria used to evaluate each alternative:

Biophysical effects  
Social/Recreational/Experiential effects  
Societal/Political effects  
Health/Safety concerns  
Economical/Timing considerations

1. Alternative B: Trapping and Hunting assisted by dogs –Trapping would remove 80-90% of a pig population. The remaining pigs would need to be hunted assisted by dogs. This alternative would remove pigs from within the Monument fence and would thus eliminate the impacts that pigs currently have on the environment. A multiple capture trap that allows entire family groups to be caught would be used. It is a large structure (10 ft x 10 ft), with a closed top and a spring hinged door that allows pigs to push it open but they cannot exit. Approx. 16 traps will be placed within the Pinnacles fence; those in roadless areas will be flown in/out with helicopter. Hunters will camp near traps when in use. Dogs will be brought weekdays to facilitate flushing and eradication of untrappable pigs. Hunters with dogs will camp as needed. Hunting will be conducted day and night as needed. Majority of action will take place May – September. Design standards will follow those used at other state and federal parks that have used this method in their feral pig management program. It will take up to 3 years. This method has proven the least impactful and most effective technique. Mitigations include: hunters will use silencers; hunting will be restricted to weekdays only; hunting prohibited weekends, spring break and Easter break; traps will be placed in non-sensitive habitats; if cultural resources are found during placement, trap will be relocated and experts called in for assessment; trail closure will keep weekday visitors out of hunting areas; all pigs will be confirmed dead; non-lead bullets will be used to prevent secondary poisoning to scavengers. Biophysical effects/benefits of this alternative: Feral pigs removed from fenced portion of PNM w/in 3 years. Cessation of disruption/destruction of vegetation including specialized habitats such as oak lands and riparian, fauna, special species, geologic resources, cultural resources, and water quality degradation. Short term dog presence sporadically over 3 years (approx 2 wks/session 6-12 times/yr). Social/recreation effects/benefits: Picnic areas and trails will no longer be regularly rooted up and disturbed, improved trail safety, cessation of disruption of cultural resources. Societal/political effects/benefits: Long term preservation of PNM resources for future generations for scientific study and visitor enjoyment. Health and safety concerns/benefits: Picnic areas and trails would not be uprooted eliminating tripping and falling hazards. Human/pig conflict opportunities eliminated. Economic and timing considerations/benefits: Feral pig damage to resources is stopped w/in 3 years. Routine maintenance of 32 miles of pig fence forever. Heritage resource considerations/benefits: Historic features and landscapes will be protected from further destruction.



2. Alternative C: This alternative would use the same capture and hunt methods, helicopter, camping, and mitigations described in Alternative 1 above. Instead of using bullets to immediately euthanise the pigs, each pig would be singled out in the pen, injected with a chemical sterilant, and permanently ear notched or tail cut to indicate it has been treated then released to live out its life. Since trappable and untrappable pigs would run together, there would be a greater intensity of hunting with dogs to make sure every pig within the fence had been treated. Biophysical effects/benefits of this alternative: 10 years no control while effective drug developed continued pig disruption/destruction of resources. Negative impacts to vegetation and special habitats (oak lands and riparian), fauna and special species (California Red-legged frog), geologic resources, cultural resources, water quality. 5 years of dog presence in park to capture and mark 99% of all pigs w/in fenced area. Social/recreation effects/benefits: Continued destruction of picnic areas and trails from pig rooting. Societal/political effects/benefits: Development of effective pig sterilant; continued degradation of PNM resources since pigs will not be completely removed from fenced area for 23 years after project is implemented (10yrs drug development, 5 yrs capture/treat 99%, 5-7 yr natural life span), possibility of perpetual pig presence from new entries into fence areas through breaches. Health and safety concerns/benefits: Continued opportunity for human/pig conflicts. Continued disruption of picnic and trail areas causing tripping and falling hazards. Economic and timing considerations/benefits: 10 years to develop effective drug. 5 years to capture and treat 99% of all pigs inside fence area after drug is administered. Unknown costs to develop drug, high cost to capture 99% of pigs, high cost for vigilant monitoring to ensure all pigs in fence are treated to keep population growth to zero. Attentive maintenance of 32 miles of fence forever. Heritage resource considerations/benefits: Continued disturbance of historic structures and landscapes.

3. Alternative D: This alternative would use the same capture methods described in Alternative 1 above. All captured pigs would be euthanised and their carcasses distributed throughout the local environment. Untrappable pigs would be left at large. There would need to be an annual capture/kill program to maintain low levels of pigs in the Monument. Approx. 16 traps will be placed within the Pinnacles fence; those in roadless areas will be flown in/out with helicopter. Hunters will camp near traps when in use. Majority of action will take place May – September. Design standards will follow those used at other state and federal parks that have used this method in their feral pig management program. Mitigations include: hunters will use silencers; hunting will be restricted to weekdays only; hunting prohibited weekends, spring break and Easter break; traps will be placed in non-sensitive habitats; if cultural resources are found during placement, trap will be relocated and experts called in for assessment; trail closure will keep weekday visitors out of hunting areas; all pigs will be confirmed dead; non-lead bullets will be used to prevent secondary poisoning to scavengers. Biophysical effects/benefits of this alternative: Annual trap/kill program to control pig population. Continued negative impacts to vegetation and special habitats (oak lands and riparian), fauna and special species (California Red-legged frog), geologic resources, cultural resources, water quality. California Condor and other scavengers would benefit from seasonal increase in food supply. Social/recreation effects/benefits: Continued destruction of picnic areas and trails from pig rooting. Societal/political effects/benefits: Long term loss of resources due to continued presence of feral pig in Pinnacles, cumulative effects would cause impairment of resources. Health and safety concerns/benefits: Continued opportunity for human/pig conflicts. Continued disruption of picnic and trail areas causing tripping and falling hazards. Economic and timing considerations/benefits: Requires annual capture/kill program most likely June-August to keep efficacy rate to a near zero growth rate. Initial capture rates are 80-90% but as pigs become human and trap wary capture rates drop to 50-70% in 2-3 yrs. Heritage resource considerations/benefits: Continued disturbance of historic structures and landscapes.

4. Alternative F (this alternative was considered and dismissed in EA): This alternative would not involve trapping feral pigs but would just hunt them assisted by dogs. All pigs would be hunted until no pig sign remained. Dogs will be brought weekdays to facilitate flushing and eradication of pigs. Hunters with dogs will camp as needed. Hunting will be conducted day and night as needed. Majority of action will take place May – September. Mitigations include: hunters will use silencers; hunting will be restricted to weekdays only; hunting prohibited weekends, spring break and Easter break; trail closure will keep weekday visitors out of hunting areas; all pigs will be confirmed dead; non-lead bullets will be used to prevent secondary poisoning to scavengers. Biophysical effects/benefits of this alternative: This alternative would require an extended presence of hunters and dogs to remove all feral pigs from within the fenced area, estimated at 5 years of active removal. Impacts to wildlife would increase due to extended presence of scent of dogs. Continued negative impacts to vegetation and special habitats (oak lands and riparian), fauna and special species (California Red-legged frog), geologic resources, cultural resources, water quality. Social/recreation effects/benefits: Increased hunting activity within monument boundaries would increase potential hazards to visitors and employees. Most likely would result in closed areas while hunting was in process. Continued destruction of picnic areas and trails from pig rooting. Societal/political effects/benefits:

None Health and safety concerns/benefits: Increased presence of hunters and dogs would increase need to close off trails of the monument to minimize visitor/hunter conflicts. Continued opportunity for human/pig conflicts. Continued disruption of picnic and trail areas causing tripping and falling hazards. Economic and timing considerations/benefits: Hunting would need to be done when natural food supplies are low so pigs will respond to baiting. Heritage resource considerations/benefits: Continued disturbance of historic structures and landscapes.

**List preferred alternative and give justification:** Alternative B is the most effective, most humane to the pigs, and least “impactive” management tool available given present technology and would protect a significant portion of Pinnacles resources from continued damage in the shortest time frame. It is estimated that 80-90% of the pigs will be caught in the capture traps, leaving the remaining 10-20%, know as untrappable pigs to be removed by dog assisted hunting. This will be achieved in 3 years. Specific maintenance requirements are quarterly walking of fence to check for breaches, repairing breaches promptly. Repairing breaches after natural events such as floods.